

## METHODS AND APPARATUS FOR A TOE-UP PUTTER CLUB HEAD

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### Field of Invention

[0001] The present invention relates, generally, golf club heads and, more particularly, to an improved putter club head for use with, for example, extended-length putters.

### Background of the Invention

[0002] A golfer's ability to properly line up a ball with the club head to produce the desired ball path is largely a function of the various visual cues provided to the golfer by the club head during and after address. This is particularly the case with putting, where the golfer's address and stroke direction are highly influenced by psychological and visual factors.

[0003] While putter club heads are typically designed such that the sole of the putter, during proper address, rests square with respect to the ground, it is known that golfers often roll the golf club head slightly forward onto the toe during address. This practice is especially prevalent with extended length or "long" putters. When the club is rolled forward onto the toe, the shaft is more vertical, and the golfer is positioned more directly over the ball.

[0004] Golf club design is strictly governed by various national and international standards, one of which specifies that the club's shaft must have a minimum angle (e.g., about 10 degrees) with respect to the club head body. This prevents club manufacturers from producing putters that can act as simple pendulums when held directly over the ball.

[0005] In prior art putters, when the golfer positions the club so that the shaft is more vertical, the toe of the club head is necessarily lower than the heel of the club head. The visual effect of this height difference can be distracting to the golfer, and can prevent the golfer from achieving proper address and swing direction.

**Summary of the Invention**

[0006] The present invention generally provides a putter club head configured such that the toe thickness is greater than the heel thickness, thus compensating for the toe-down look encountered, for example, in extended-length putters. In accordance with a further aspect of the present invention, the club head body in the heel region is weight-compensated to substantially balance with the toe region. In accordance with one embodiment, cut-out regions are provided in the back of the club head body in the toe region and the heel region to provide the required weight compensation. In accordance with another embodiment of the present invention, a bore configured to accept the shaft is provided on the top rail at approximately the midpoint between the toe and heel regions.

**Brief Description of the Drawings**

[0007] The subject invention will hereinafter be described in conjunction with the appended drawing figures, wherein like numerals denote like elements, and:

[0008] FIGS. 1A and 1B are front views of a putter club head in accordance with one embodiment of the present invention;

[0009] FIG. 2 is a back view of the putter club head shown in Fig. 1;

[0010] FIG. 3 is a top view of the putter club head shown in Fig. 1;

[0011] FIG. 4 is an isometric back view of the putter club head shown in Fig. 1; and

[0012] FIG. 5 is a front view of a putter club head in accordance with another aspect of the present invention.

**Detailed Description**

[0013] The present invention generally provides a club head body with an upwardly sloping toe region having a thickness greater than the heel thickness, thereby compensating for the toe-down look encountered in many putters, particularly extended-length putters.

[0014] Referring to Fig. 1A, a club head 100 in accordance with one embodiment of the present invention comprises a body 102 having a toe region 110, a heel region 108, a sole 112, a face (or "striking surface") 120, and a top surface (or "top rail") 130 generally opposite said heel 112. A hosel or, as illustrated, a bore 103 is configured to accept a shaft 104. In one embodiment, bore 103 is located at substantially the midpoint between toe region 110 and heel region 108. In this regard, while the illustrated embodiment is described in the context of a bore 103 provided within body 102, the present invention contemplates any suitable hosel, bore, or other attachment method that mechanically couples shaft 104 to body 102. In the interest of brevity, the term "hosel" may be used herein to designate any such attachment method.

[0015] In the illustrated embodiment, toe region 110 is characterized by a toe thickness  $d_{\text{toe}}$ , and heel region 108 is characterized by a heel thickness  $d_{\text{heel}}$ . These thicknesses are suitably defined by the distances between sole 112 and top surface 130 at heel region 108 and toe region 110 respectively.

[0016] As shown in Fig. 1A, when club head 100 is positioned such that sole 112 is level (or symmetrical about its midpoint) with respect to reference 114, toe region 110 is farther from reference 114 (i.e., closer to the golfer's hands), and heel region 108 is closer to reference 114 (i.e., farther from the golfer's hands). When club head 100 is rolled forward such that sole 112 contacts reference 114 closer to toe region 110 (i.e., when shaft 104 is held more upright), the position of body 102, and consequently top surface 130, changes significantly. More particularly, referring now to Fig. 1B, when club head 100 is rolled

forward, sole 112 rotates from a first position 152 to a second position 150, and top surface 130 changes position accordingly, giving the appearance of a level top surface extending along a line 160 that is substantially parallel to reference 114.

[0017] Referring again to Fig. 1A, a club head 100 in accordance with one aspect of the present invention is characterized by a toe thickness  $d_{toe}$  equal to heel thickness  $d_{heel}$  multiplied by a toe-up factor  $k$ . In the illustrated embodiment, for example (which is not necessarily to scale), toe-up factor  $k$  is between approximately 1.20 and 1.40, preferably about 1.3. The present invention comprehends any suitable toe-up factor, and may be selected based on any number of design factors, including, for example, the curvature of surfaces 112 and/or 130, the length of shaft 104, the position of hosel or bore 103 with respect to body 102, and the length of body 102.

[0018] Top surface 130 may be of any suitable shape, width, and length. In one embodiment, surface 130 is generally concave (when viewing face 120 from the front as shown in Fig. 1A), and has a radius of curvature greater than or equal to that of sole 112. The present invention, however, is not so limited, and contemplates any suitable club head shape.

[0019] In accordance with a further aspect of the present invention, the club head body in said heel region is weight-compensated to substantially balance with said toe region. That is, to the extent that body 102 in toe region 110 is generally thicker than body 102 in heel region 108, it is desirable to compensate for any resulting imbalances in club head 100.

[0020] Weight-compensation may be achieved in a number of ways. For example, weights, inserts, or added material may be incorporated into heel region 108, either internally (e.g., high-density inserts) or externally. Conversely, material may be removed from body 102 in toe region 110. In accordance with one embodiment, cut-out regions are provided in the back of the club head body in the toe region and the heel region. The

respective geometries of these inserts are selected to provide the required weight compensation. In this regard, club head 102 may be manufactured using any suitable materials, including various metals, plastics, ceramics, or a combination thereof. In one embodiment, club head body 120 comprises a contiguous metal material, e.g., a dense titanium alloy.

[0021] Referring to Figs. 2, 3, and 4, which depict an exemplary club head 100 as seen from various views, club body 102 suitably includes two cut-outs: one cut-out 202 in heel region 108, and another cut-out 204 in toe region 110. Cut-out 202 has a volume that is greater than that of cut-out 204. The difference in cut-out volume, multiplied by the density of the material (or materials) used to manufacture body 102, substantially compensates for the difference in weight resulting from the difference in thicknesses of the toe and heel areas 110 and 108.

[0022] In the illustrated embodiment shown in Figs. 2 and 4, cut-outs 202 and 204 have similar shapes, but have different depths. It will be appreciated, however, that the present invention is not so limited. For example, cut-outs 202 and 204 may have the same depth but different shapes, or may comprise multiple cut-outs (e.g., perforations and the like) distributed to produced the desired weight balancing.

[0023] In accordance with a further aspect of the present invention, club head body 102 is weight-compensated such that the center of gravity of the club head body substantially lies on the shaft axis. That is, referring now to Fig. 5, club head body 102 has a center of gravity (or center of mass ) 504. The position of center of gravity 504 may be specified by changing the shape and/or composition of body 120. In the illustrated embodiment, cut-outs 202 and 204 (shown in Fig. 2) are configured such that center of gravity 504 substantially lies on axis 502 of shaft 104, or is configured such that a projection of center of gravity 504 onto a plane

parallel to club head face 120 lies on a line resulting from projection of shaft axis 104 onto that same plane. Such a club head is said to be "face balanced."

**[0024]** Furthermore, to the extent that it is desirable to lower the center of gravity on face 120, it is advantageous for body 102 to comprise a low profile region (close to the sole) extending outwardly from the back of the club head. Such a configuration is shown in Figs. 2, 3, and 4, which depict an exemplary low-profile region 200.

**[0025]** Although the invention has been described herein in conjunction with the appended drawings, those skilled in the art will appreciate that the scope of the invention is not so limited. Modifications in the selection, design, and arrangement of the various components and steps discussed herein may be made without departing from the scope of the invention as set forth in the appended claims.